UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte SHOHEI MATSUO, SEISHI TAKAMURA,
KAZUTO KAMIKURA, and YOSHIYUKI YASHIMA

_____

Appeal 2017-000929
Application 13/122,054
Technology Center 2400

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Before HUNG H. BUI, BETH Z. SHAW, and AARON W. MOORE,
Administrative Patent Judges.

MOORE, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants[1] appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 1–8 and 10, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse and enter a NEW GROUND OF REJECTION UNDER 37 C.F.R. § 41.50(b).

THE INVENTION

The application is directed to "a deblocking method used in a video coding apparatus." (Spec. ¶ 1.) Claim 1, reproduced below, is exemplary of the subject matter on appeal:

> 1. A deblocking method for reducing block distortion occurring in a video coding scheme for performing predictive coding on a block basis and in a video decoding scheme for decoding video coded by the video coding scheme, the method comprising:
>
> a detection step of detecting, for each block, a direction in which a pixel value is changed which is represented by an edge that indicates a direction of change in pixel value in each block;
>
> a determination step of determining a direction in which a deblocking filter is to be applied to a block boundary, based on a combination of a direction of an edge detected for a block to be processed which includes the block boundary subject to deblocking and a direction of an edge detected for at least one block contacting the block to be processed, a direction of an edge detected for a block which is included in the at least one block being different from the direction of the edge detected for the block to be processed; and

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[1] Appellants identify Nippon Telegraph and Telephone Corporation as the real party in interest. (*See* App. Br. 3.)

a filtering step of applying the deblocking filter to the block boundary in accordance with the determined direction.

THE REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Moon et al.	US 2005/0201633 A1	Sept. 15, 2005
Lee et al.	US 2006/0033936 A1	Feb. 16, 2006
Kim et al.	US 2006/0181740 A1	Aug. 17, 2006

Dung T. Vo, et al., *Edge-Based Directional Fuzzy Filter for Compression Artifact Reduction in JPEG Images*, 15th IEEE International Conference on Image Processing, pp. 797–800 (Oct. 2008)

THE REJECTION

Claims 1–8 and 10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Vo, Kim, Moon, and Lee. (*See* Final Act. 6–14.)

ANALYSIS

Appellants explain that "[i]n conventional video encoding/decoding . . . a picture is divided into blocks and then coded" and "[w]hile this process can significantly compress the digital representation of the encoded picture, removal of high frequency components produces an undesirable side effect" in that it "can generate block noise at the boundaries." (App. Br. 12.) The application is generally directed to a "deblocking filter," which "operates upon pixels that are perpendicular to [a] block boundary, adaptively applying filtration to those pixels based on boundary strength and pixel difference." (*Id.*) In particular, Appellants characterize their invention as

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"tak[ing] into account edge information from not only the block to be processed, but also edge information from a block contacting the block to be processed." (App. Br. 15.) Appellants assert that "[i]n so doing, [the] invention can handle situations in which a line segment of texture is disjointed or interrupted across a block boundary" and also "exclude the texture to which a deblocking filter is to be applied." (*Id.*)

The block/contacting block aspect of the invention is claimed in the "determining" step, in which the deblocking filter direction is "based on a combination of [A] a direction of an edge detected for a block to be processed . . . and [B] a direction of an edge detected for at least one block contacting the block to be processed."

In rejecting claim 1, the Examiner finds Vo "teaches processing blocking artifacts" and concludes that "[i]t would have been obvious . . . to modify Vo's invention utilizing edges across block boundaries using block boundaries considerations as taught by Lee, Kim, and Moon and further with adaptive filtering considering other block edges detected by Lee, Kim, and Moon." (Final Act. 6–7.)

Appellants argue the rejection is unfounded because "none of the references teach or suggest that the filter direction should be determined based on Appellants' claimed combination of: (1) the edge direction of a block to be processed and (2) the edge direction of a block that contacts the block to be processed." (App. Br. 26.)

We agree with Appellants that the cited portions of Lee, Kim, or Moon do not teach or suggest the use of "a direction of an edge detected for a block to be processed" and "a direction of an edge detected for at least one block contacting the block to be processed."

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Moon describes a method that includes "search[ing] for direction of a 4x4 block . . . using pixels located on the boundaries of upper and left two blocks that are adjacent to a current block in a spatial domain." (Moon ¶ 65.) Even if it is the case that Moon uses pixel information from a contacting block, we do not agree that it teaches or suggest use of "a direction of an edge detected" for such a block.

The cited portions of Kim relate to an "edge distinguisher" that "distinguishes pixels into three kinds," "a non-edge pixel corresponding to the homogeneous region," "an object edge pixel corresponding to a person or object contour line," and "a block edge pixel corresponding to the block boundary region generated in a block based encoding process." (Kim ¶ 70.) We do not agree with the Examiner that such a disclosure teaches or suggests use of "a direction of an edge detected" for contacting blocks.

Lee, in the cited portion, describes a technique for "sharpness" improvement that "operates . . . an overlapped block structure." (Lee ¶ 92.) Although this uses information from different blocks, Lee does not teach or suggest the use of directions of edges associated with the blocks.

The Examiner's reliance on these references may be explained by the comment on page 8 of the Answer that "the pixels in a block are considered to determine and edge direction for the block" and "[t]hus, pixel edge information serves as a nexus in determining the edge direction of a block." However, the fact that pixels of a block *can* be used to determine a direction of an edge in that block does not mean that *any* use of pixels in a block constitutes determining a direction of an edge for the block based on its pixels.

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Because we agree with Appellants that the cited art does not teach or suggest

> determining a direction in which a deblocking filter is to be applied to a block boundary, based on a combination of a direction of an edge detected for a block to be processed which includes the block boundary subject to deblocking and a direction of an edge detected for at least one block contacting the block to be processed,

we do not sustain the Section 103(a) rejection of claims 1–8 and 10.

NEW GROUND OF REJECTION
UNDER 37 C.F.R. § 41.50(B)

Claims 1, 7, and 10 are newly rejected under 35 U.S.C. § 103(a) as unpatentable over Vo and Jongho Kim, et al., *Reduction of Blocking Artifacts for HDTV using Offset-and-Shift Technique*, IEEE Transactions on Consumer Electronics, Vol. 53, No. 4 (Nov. 2007) ("*Reduction of Blocking Artifacts*").[2]

In essence, we adopt the Examiner's findings and explanations regarding the teachings of Vo but substitute *Reduction of Blocking Artifacts* in place of Lee, Kim, and Moon.

Vo teaches deblocking with a directional filter. As explained above, however, Vo does not explicitly teach determining the direction "based on a combination of a direction of an edge detected for a block to be processed which includes the block boundary subject to deblocking and a direction of an edge detected for at least one block contacting the block to be processed," as recited in independent claims 1, 7, and 10.

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[2] *Reduction of Blocking Artifacts* was first cited in an IDS submitted on June 3, 2016, after the mailing date of the Final Action.

In the same field of endeavor, *Reduction of Blocking Artifacts* teaches or suggests the missing feature, as it describes directional deblocking in which the direction of the filter is based on the type of block *and the type of an adjacent block*, where the type of block (e.g., "UDB," "VDB") reflects the direction of an edge in the block. (*See Reduction of Blocking Artifacts*, Section III.B ("Since horizontal or vertical edges usually appear in several consecutive blocks instead of in an 8×8 block only, we examine the type of adjacent DB before the DDB filtering.").) The type of block is the "direction of an edge detected for the block" or, at a minimum, teaches or suggests use of the direction of a detected edge for the block, as it emphasizes the desirability of determining edge information for adjacent blocks on a whole block basis.

We conclude that it would have been obvious to one of skill in the art at the time of the invention to modify Vo's directional filter with the teachings in *Reduction of Blocking Artifacts* regarding the use of edge information for the block and a contacting block. The skilled artisan would have been motivated to make the combination because the use of an edge direction determined for the block and an adjacent block would have allowed for a more accurate determination of the edge direction (or the non-existence of an edge) and, thus, a more accurate filter direction.

Claims 1, 7, and 10 are therefore rejected as unpatentable over Vo and *Reduction of Blocking Artifacts*. We have not reviewed the dependent claims to the extent necessary to determine whether these claims are unpatentable under 35 U.S.C. § 103(a). Instead, we leave it to the Examiner to determine whether the dependent claims are patentable over Vo and *Reduction of Blocking Artifacts*.

DECISION

We reverse the Examiner's 35 U.S.C. § 103(a) rejection of claims 1–8 and 10. We enter a new ground of rejection of claims 1, 7, and 10 under 35 U.S.C. § 103(a), pursuant to 37 C.F.R. § 41.50(b).

TIME PERIOD

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b).

37 C.F.R. § 41.50(b) provides that "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review" and that Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) reopen prosecution by submitting an appropriate amendment of the claims so rejected, or new Evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner; or

(2) request that the proceeding be reheard under § 41.52 by the Board upon the same Record.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

REVERSED
37 C.F.R. § 41.50(B)